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# THE STRUCTURE OF ECONOMIC GROWTH IN MAINE AND NEW ENGLAND

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THE STRUCTURE OF ECONOMIC GROWTH  
IN MAINE AND NEW ENGLAND

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## INTRODUCTION

The rapid economic growth of Maine and New England is a central concern to both state and local officials throughout Maine. The rapid growth of employment opportunities in the southern and coastal portions of Maine coupled with the declining agricultural base in the northern region has produced the popular notion of the existence of "two Maines." If the economic structure of Maine does support the notion of two Maines, then a comprehensive state development policy must be constructed to reflect the economic diversity of the state.

In order to promote a controlled pattern of economic growth or, in some regions, stimulate growth, it is important to possess a basic grasp of the economic factors contributing to the growth experienced by the region. In some instances, the nature of the growth may be used as a foundation upon which to build expectations of future growth potential and regional patterns.

Regional growth may be characterized in two basic manners. The first characterization hinges on the industrial mix of the region. If the region is composed of a diverse blend of high-growth industries, the prospect for future growth of the region is positive. If the region is more specialized, or less diverse, expectations for future growth may be low. The second characterization is related to the growth of the region's individual industries relative to the nation. If an industry within the region is growing at a level faster than the national average, there exists reasons to believe that the region may have a comparative advantage in producing that good. Conversely, if a region's industry is growing at a slower level, which implies decreasing market shares, prospects for future economic growth may be low.

The impact these alternative characterizations of growth may have on development policy is unquestionable. There is no doubt that attracting a high-growth industry to a region will influence overall level of growth. It is equally as clear, however, that a region may also stimulate growth by absorbing a larger share of slow growth or declining industries. Regardless of the final objective of development policy, these two characterizations of growth may be used to examine a region's historical economic growth.

A method commonly used in regional analysis to describe the differences in levels of economic growth across regions is the shift-share method. Originally developed in the early 1960s, this method is particularly attractive because of the relative ease of computation and interpretation of the results (Ashby 1964; Hewings 1977; Paraskevopoulos 1974; and Perloff et al. 1960). The shift-share method describes changes in the regional economy in a manner that enables local officials to better understand and evaluate their economy relative to a larger geographic economy and to develop realistic policies.



The research reported here employs the shift-share method by examining the recent (1981-1986) growth patterns in the economic structure of Maine and New England. The first section of the paper briefly describes the shift-share method and its limitations. The second section describes data employed and is followed by an empirical comparison of Maine to other New England states. Next, a detailed analysis of Maine's sub-regions (i.e., counties) is presented, and the paper closes with a short summary of the results and policy implications.

## THE SHIFT-SHARE METHOD

Shift-share is a descriptive tool which disaggregates changes in a regional economy into three components: the regional share; the proportional shift, or industry mix; and the differential shift, or competitive component. The regional share measures the expected growth in economic output of the regional economy if the industry in the region grew at the same rate as total industrial growth in the nation. The regional shift compares the difference between the region's actual growth and the regional share. If the regional shift is positive, the region grew at a rate faster than the nation and can be interpreted as increasing its share of the national economy. If the regional shift is negative, the region grew at a rate slower than the nation; hence decreasing its share of the national economy.

The regional shift, in turn, is composed of two components: proportional and differential shifts. The proportional shift examines the blend of industries in the region. Specifically, comparing the level of activity of each regional industry to the set of national industries with above average growth rates. If the proportional shift for the region is positive, then the region has a higher level of economic activity in fast growth industries than the national average. A positive shift may be interpreted as an indication of a good blend, or mix of industries. If the proportional shift is negative, then the region has a higher level of activity in slow growth industries than the national average. Conversely, a negative shift may be interpreted as evidence of a more specialized economy.

The differential shift compares the growth rate of individual industries in the region to the national growth rates of the same industries. If the differential shift is positive, the region's industries grew at a rate faster than the nation. In other words, the region's share of industrial activity increased. A negative differential shift implies that the region lost part of its industrial share.

### A Mathematical Representation

Allow  $X_{r0}$  and  $X_{rt}$  to represent the total level of economic activity in region  $r$  at time  $0$  and  $t$ , where time  $0$  is the base year. The analysis compares the change in activity from the base year to the year  $t$  (for this analysis a change in activity from 1981, the base year, to 1986). In addition, allow  $X_{roi}$  and  $X_{rti}$  to be the level

of activity in the  $i^{\text{th}}$  industry in the region for the two respective time periods. National levels of each variable are represented by suppressing the subscript  $r$ .

The actual total regional growth ( $G$ ) from time  $o$  to the time  $t$  for the region is

$$G = X_{rt} - X_{ro}.$$

The regional share ( $R$ ) is defined as the region's growth if the region had grown at the national average, or

$$R = (X_t/X_o) * X_{ro} - X_{ro}.$$

The regional shift ( $RS$ ) is simply the difference between the actual growth ( $G$ ) and the regional share:  $RS = G - R$ . If  $RS$  is positive, then the region grew at a rate faster than the nation. If  $RS$  is negative, the region grew at a rate slower than the nation. The information contained in  $RS$ , however, provides limited information about the structure of regional economic growth. In order to provide additional information,  $RS$  may be decomposed into two components.

The proportional shift ( $PS$ ) is defined as

$$PS = \sum_i X_{roi} * [(X_{ti}/X_{oi}) - (X_t/X_o)].$$

If  $PS$  is positive the region has a higher proportion of activities in fast growth industries than the nation. A positive  $PS$  can be interpreted as an indication of a good blend or mix of industries. If  $PS$  is negative, the converse holds.

The differential shift ( $DS$ ) component is defined as

$$DS = \sum_i X_{roi} * [(X_{ti}/X_{roi}) - (X_t/X_o)].$$

A positive  $DS$  is an indication that individual industries in the region grew at a faster rate than the national industrial growth rate and the region increased its share of the industry market. Again, if  $DS$  is negative, the converse is true.

### Limitations to Shift-Share

The advantage of employing the shift-share method is that it provides a consistent framework with which to compare and contrast the growth or decline of economic activity within and across regions. Unfortunately, there exist several limitations to the method (Hewings 1977; Stevens and Moore 1980). In particular it should be noted that the shift-share method was originally intended to be descriptive in nature by performing *ex post* analyses of the components of the change in the regional economy. Attempts to base detailed forecasts of the region's economy on a shift-share analysis may not be advisable because the method does not provide insight into the reasons for the changes described. In order to understand why these shifts occur it is necessary to turn to more complex theories of regional growth and economic structure. Any forecast based on

shift-share analysis should be of a general nature and held to a short-run time frame.

Additional limitations include the arbitrary selection of the base and ending years. Selection of a peak and/or a trough year on the aggregate economic trend may alter the conclusions of the analysis. The manner in which economic activity is measured may also affect the conclusions of the analysis. In addition, the selection of a base or reference economy upon which to base comparisons of the region of interest may also alter conclusions. Finally, the method is deterministic in the sense that no statistical tests of significance of the shifts are available. With these limitations in mind, the shift-share method may still be used to provide insight into the structure of a region's economic growth and identify potential short-run trends.

## DATA AND PROCEDURES

The level of industrial activity is measured in this analysis by personal income data as reported by the Bureau of Economic Analysis (BEA). The implicit capture of regional cost of living variations and differences in full and part time employment, as well as underemployment, are the primary advantages to using income data. The BEA reports annual data for eleven broad-based industries:

- (1) farm;
- (2) agricultural services, forestry and fisheries;
- (3) mining;
- (4) construction;
- (5) manufacturing;
- (6) transportation and utilities;
- (7) wholesale trade;
- (8) retail trade;
- (9) finance, insurance and real estate;
- (10) services; and
- (11) government.

This analysis disaggregates total economic activity for each region into these eleven industries.

The time frame examined is from 1981 to 1986. Because data are available annually, it is possible to compute regional, proportional, and differential shifts over several different time frames. By reporting the results for each separate time frame more information is introduced into the analysis, and the arbitrariness of selecting a single base and ending year is minimized. The shift-share analysis reported here examines changes over one year periods from 1981 to 1986.

A convenient method to demonstrate the descriptive interpretation of the information provided by the proportional and differential shifts is to construct a simple four cell diagram (Figure 1). The diagram is constructed with four possible combinations of proportional and differential shifts. If a region is characterized by both a positive proportional and differential shift, the region is placed in the upper left cell of the diagram. The growth experienced by such a region may be characterized as the product of a diversified economic base and a high proportion of fast growth industries. A region experiencing negative shifts is located in the lower right cell and may be characterized as an economy specializing in a slow growth industry. The incident of a mix of positive and negative shifts completes the diagram.

**Figure 1**  
**Descriptive Interpretation of**  
**Proportional and Differential Shifts**

		Proportional Shift	
		+	-
D i f f e r e n t i a l	+	diversified & fast growth	specialized & fast growth
	-	diversified & slow growth	specialized & slow growth

### MAINE WITHIN NEW ENGLAND

In order to minimize the potential for bias due to the selection of a base economy, Maine and each New England state is compared first to the national economy then to New England as a larger regional economy.

### Maine to the US

Regional shifts (RS) for Maine, New England, and each New England state relative to the national economy are reported in Table 1. Of the five periods examined, New England, as a regional economy, grew at a relative level substantially above the US as a whole. Maine grew at a level above the US in four of the five annual periods between 1981 and 1986. This suggests that Maine increased its share of the US economy over the time period examined. Only between 1984 and 1985 was the growth of Maine below the US growth level (i.e.  $RS < 0$ ).

**Table 1. Regional Shift: New England States Relative to the US**

Year	NE	ME	CT	MA	NH	RI	VT
1981–1982	2401.6	68.1	622.8	1458.5	170.9	49.6	31.8
1982–1983	2807.5	178.2	489.4	1456.4	564.6	131.9	-13.0
1983–1984	2381.7	26.2	684.8	1359.4	338.1	-31.4	4.8
1984–1985	1360.7	-43.8	293.0	555.0	601.0	-123.8	78.3
1985–1986	4117.6	337.5	1034.8	1998.5	481.9	98.1	170.0

NE, New England; ME, Maine; CT, Connecticut; MA, Massachusetts; NH, New Hampshire; RI, Rhode Island; VT, Vermont

Note:  $RS > 0$  implies the region grew faster than the US and  $RS < 0$  implies the region grew slower than the US.

Comparing Maine to the remaining five New England states indicates that Maine consistently ranks behind Connecticut, Massachusetts, and New Hampshire, but ahead of Rhode Island and Vermont, in terms of growth levels relative to the level of growth of the US. Massachusetts accounted for the majority of the shift of the national economy to the New England region. Over the five time periods examined, Maine accounted for approximately 3%, on average, of the shift of the national economy to New England.

While the analysis of regional shifts provides insight into the growth or decline of Maine's share of the US economy, it does not provide insight into the basic characteristics of the growth. Computations of the proportional shift (Table 2) and the differential shift (Table 3) for Maine, New England and each New England state provides such insight. As demonstrated in Figure 2, Maine's economic growth over the period 1981 to 1986 can be characterized as being supported by a specialized ( $PS < 0$ ), but high-growth ( $DS > 0$ ), economic base.

The economic structure supporting the growth of New England, however, may be characterized as high-growth ( $DS > 0$ ) and diversified ( $PS > 0$ ). This characterization presents, perhaps, the best scenario for continued economic

**Table 2. Proportional Shift:  
New England States to the Nation**

Year	NE	ME	CT	MA	NH	RI	VT
1981-1982	-1787.8	-132.0	-649.0	-674.9	-135.9	-112.8	-82.8
1982-1983	537.6	-4.7	116.8	406.0	18.6	37.1	-35.7
1983-1984	1032.0	54.0	282.7	492.1	76.8	54.7	71.4
1984-1985	133.6	-71.8	15.4	267.1	-2.4	7.7	-82.4
1985-1986	6844.1	862.3	1598.0	2302.7	399.2	511.1	1161.0

NE, New England; ME, Maine; CT, Connecticut; MA, Massachusetts; NH, New Hampshire; RI, Rhode Island; VT, Vermont

Note: PS>0 implies that regional industrial growth as a whole was greater than the industrial growth of the US, while PS<0 implies the converse.

**Table 3. Differential Shift: New England States to the Nation**

Year	NE	ME	CT	MA	NH	RI	VT
1981-1982	2386.0	71.6	802.8	1176.1	266.3	19.8	44.3
1982-1983	2711.0	152.7	498.7	1457.9	413.6	118.3	75.8
1983-1984	1750.2	19.0	437.0	1209.7	140.4	8.9	-68.1
1984-1985	2886.9	61.7	852.0	1236.4	463.3	60.3	203.8
1985-1986	-2558.5	-541.2	-522.1	-410.5	217.9	-287.5	-994.2

NE, New England; ME, Maine; CT, Connecticut; MA, Massachusetts; NH, New Hampshire; RI, Rhode Island; VT, Vermont

Note: DS>0 implies that individual regional industries grew at a faster rate than industrial growth rates for the US, while DS<0 implies the converse.

**Figure 2  
Proportional and Differential Shifts:  
New England States Relative to the US**

New England Proportional Shift			Maine Proportional Shift		
D i f f S e h r i e f f e n t i a l	+	+	+	+	-
		82-83 83-84 84-85		83-84	81-82 82-83 84-85
	-	85-86		85-86	

**Figure 2 (cont.)**  
**Proportional and Differential Shifts:**  
**New England States Relative to the US**

		Connecticut Proportional Shift				Massachusetts Proportional Shift	
D i f f S e h r i e n t i a l		+	-	D i f f S e h r i e n t i a l		+	-
	+	82-83 83-84 84-85	81-82		+	82-83 83-84 84-85	81-82
	-	85-86			-	85-86	
		New Hampshire Proportional Shift				Rhode Island Proportional Shift	
D i f f S e h r i e n t i a l		+	-	D i f f S e h r i e n t i a l		+	-
	+	82-83 83-84 85-86	81-82 84-85		+	82-83 83-84 84-85	81-82
	-				-	85-86	
		Vermont Proportional Shift					
D i f f S e h r i e n t i a l		+	-			+	-
	+		81-82 82-83 84-85		+		
	-	83-84 85-86			-		

growth in the short run. The growth patterns experienced by Connecticut, Massachusetts, New Hampshire, and Rhode Island are similar to the growth of the New England region. The growth of Vermont, however, more closely follows that of Maine.

### Maine to New England

Additional insight into the growth patterns of Maine can be gained by using the New England regional economy as the basis for comparison. The shift component here compares Maine's actual growth to the growth that would have prevailed if the state had grown similarly to New England. The results of the recomputed regional shift using the New England base are reported in Table 4.

**Table 4 Regional Shift: New England States Relative to New England**

Year	ME	CT	MA	NH	RI	VT
1981-1982	-100.9	-73.4	337.9	2.1	-115.7	-49.8
1982-1983	-17.6	-323.1	140.4	367.2	-59.3	-107.5
1983-1984	-139.6	0.1	241.0	165.4	-192.8	-73.9
1984-1985	-137.6	-98.2	-85.7	501.2	-214.6	33.8
1985-1986	56.6	-147.1	61.5	169.6	-172.3	34.8

ME, Maine; CT, Connecticut; MA, Massachusetts; NH, New Hampshire; RI, Rhode Island; VT, Vermont

Note:  $RS > 0$  implies the region grew faster than New England and  $RS < 0$  implies the region grew slower than New England.

In four of the five periods examined, Maine's share of the New England economy decreased ( $RS < 0$ ). Only in the most recent period examined, 1985-1986, did a portion of the New England economy shift into Maine. The implication of the information presented in Tables 1 and 4 for Maine is relatively straight forward: Maine's share of the national economy increased, but Maine's share of the New England economy decreased. In other words, Maine grew faster than the nation, but not as fast as New England during the time period examined.

Decomposing the regional shift presented in Table 4 into its two components (DS and PS) provides insight into the structure of Maine's growth relative to New England. The computed proportional shift (Table 5) and differential shift (Table 6) suggest that Maine's economic growth can be characterized as supported by a diversified economy that tends to be growing slowly (Figure 3).

This conclusion should not be viewed as contradictory to the characterization from the national perspective. The growth of the Maine economy was not as diversified as the national economy (i.e.  $PS < 0$  in Table 2), but more diversified



than the New England economy ( $PS > 0$  in Table 5). Similarly, Maine's growth industries grew faster than the nation's growth industries ( $DS > 0$  in Table 3), but slower than New England's growth industries ( $DS < 0$  in Table 6). A general conclusion suggests that Maine's economy out-performed the national economy, but lagged behind the growth experienced by the New England economy during the time period 1981 through 1986.

As presented, the shift-share analysis provides no information that may identify the industries fueling regional economic growth. A simplistic approach to shed light onto the driving industries examines the change in economic activity of each industry over time and regions. The change in personal income, the measure of economic activity used in this analysis, by industry and region over the period 1981 to 1986, is provided in Table 7.

Several observations are evident upon examination of Table 7. At the national level, five industries appear to be growing faster than the national average:

**Table 5. Proportional Shift: New England States to New England**

Year	ME	CT	MA	NH	RI	VT
1981-1982	-75.8	-415.2	-418.1	-71.1	-80.4	-30.4
1982-1983	64.8	306.6	738.3	95.1	78.1	10.6
1983-1984	38.3	323.7	554.8	94.3	56.9	37.4
1984-1985	133.0	520.9	1085.5	132.8	118.2	63.7
1985-1986	58.8	328.7	760.9	82.1	60.6	29.8

ME, Maine; CT, Connecticut; MA, Massachusetts; NH, New Hampshire; RI, Rhode Island; VT, Vermont

Note:  $PS > 0$  implies that regional industrial growth as a whole was greater than the industrial growth of New England, while  $PS < 0$  implies the converse.

**Table 6. Differential Shift: New England States to New England**

Year	ME	CT	MA	NH	RI	VT
1981-1982	-102.1	84.8	111.0	91.0	-124.4	-65.2
1982-1983	-51.1	-251.2	186.2	207.6	-49.5	-35.3
1983-1984	-79.5	-79.9	337.0	8.7	-101.4	-88.8
1984-1985	-208.0	72.8	-51.3	262.1	-111.6	26.8
1985-1986	67.4	-93.0	-309.6	327.3	-23.0	41.6

ME, Maine; CT, Connecticut; MA, Massachusetts; NH, New Hampshire; RI, Rhode Island; VT, Vermont

Note:  $DS > 0$  implies that individual regional industries grew at a faster rate than industrial growth rates for New England, while  $DS < 0$  implies the converse

agricultural services, forestry, and fisheries; construction; retail trade; finance, insurance, and real estate; and the service industries. Moving across Table 7, each of the New England states experienced a growth rate greater than the national rate in each of these high-growth industries. Indeed, save for the agricultural sectors in Maine and Vermont, each New England state grew at or above the national rate industry by industry. The ranking of states by total growth complements the shift-share analysis. Each New England state grew faster than the nation, but only Massachusetts and New Hampshire grew faster than the New England rate.

**Table 7. Percentage Change in Personal Income by Source 1981–1986**

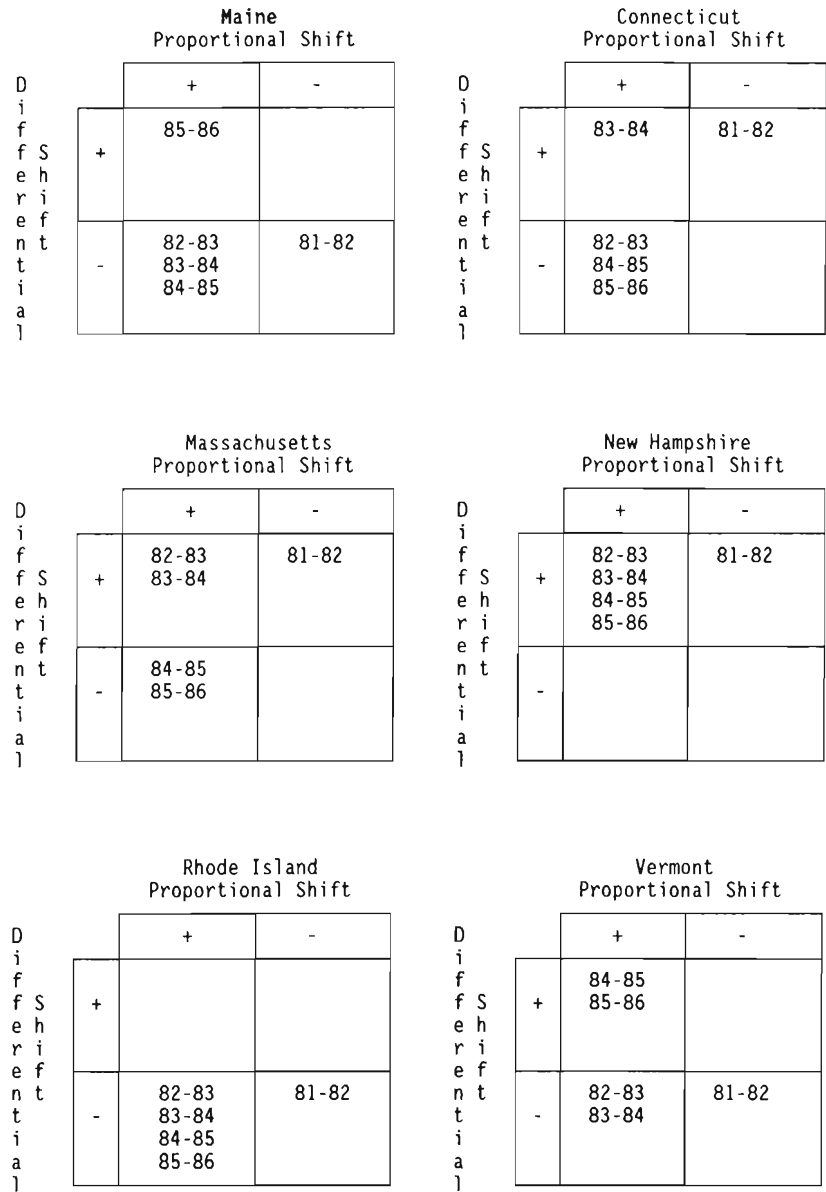
Source	US	NE	ME	CT	MA	NH	RI	VT
Farming	18.9	21.5	-47.2	71.7	55.9	35.5	380.0	-14.5
Ag. Ser, Forest and Fishery	48.4	104.4	127.1	82.7	100.0	121.7	159.4	57.9
Mining	-11.0	12.2	2.0	-0.4	29.1	41.2	15.4	14.8
Construction	45.2	105.3	93.5	97.2	110.0	130.0	96.2	92.4
Manufacturing	21.2	29.2	23.4	24.6	31.9	46.2	22.9	29.1
Transportation and Public Utilities	28.0	38.1	35.8	51.0	31.0	47.8	34.8	40.2
Wholesale Trade	34.4	58.7	56.0	50.0	64.4	70.0	50.0	59.3
Retail Trade	41.9	65.5	62.6	61.9	67.3	83.5	56.7	53.8
Finance, Insurance and Real Estate	74.2	87.5	88.0	88.1	87.9	103.1	67.4	86.8
Services	65.7	80.3	66.1	79.8	81.8	98.6	70.0	71.6
Government	39.4	43.2	40.9	56.3	38.2	46.8	35.7	44.5
Total Income	40.3	50.6	46.5	48.8	52.0	64.2	41.9	46.1

US, United States; NE, New England; ME, Maine; CT, Connecticut; MA, Massachusetts; NH, New Hampshire; RI, Rhode Island; VT, Vermont

## MAINE COUNTY ANALYSIS

The regional location of the economic growth experienced by Maine is a complex issue. Diversification in sub-regional demands and product marketability suggests that the economic growth of Maine has not been uniform in a geographic sense. It follows that the potential for continued growth may not be consistent across sub-regions. In order to provide insight into the nature of recent

**Figure 3**  
**Proportional and Differential Shifts:**  
**New England States Relative to New England**



growth and the prospect for future growth, a shift-share analysis of Maine's sub-regions is reported. In order to ensure consistency of data definitions, sub-regions are defined by county boundaries. Such a definition provides for sixteen sub-regions.

### **Maine Counties to Maine**

Using the aggregate Maine economy as a basis for computation, five county sub-regions are identified as consistently experiencing a positive regional shift (Table 8). This indicates that, over the time period studied, these five counties (Cumberland, Hancock, Lincoln, Sagadahoc, and York) increased their share of Maine's economy. The remaining eleven counties experienced consistently negative shifts over the same period, or their share of Maine's economic activity decreased. One possible conclusion of the shifts reported in Table 8 is the dominance of the growth in the Maine economy by a few counties, particularly Cumberland and York. It is of interest to note that these five counties are contained in the set of eight coastal counties. More attention will be drawn to this point below.

The results of the decomposition of the regional shift into both the proportional and differential components are provided in Figure 4. Examination of the proportional component reveals that eight county sub-regions (Cumberland, Hancock, Kennebec, Knox, Lincoln, Penobscot, Washington, and York) experienced positive shifts relative to Maine, suggesting the growth experienced by these counties may be characterized as supported by a diversified blend of industries. The remaining eight county sub-regions can be characterized as specialized economies as is evident by the negative proportional shift.

Examination of the differential component reveals that seven county sub-regions (Cumberland, Hancock, Lincoln, Sagadahoc, Somerset, Waldo, and York) benefited from industrial growth rates higher than Maine's industrial growth rate. The negative differential shift of the remaining nine counties suggests that industries located in these counties did not grow at Maine's aggregate industrial pace.

### **Maine Counties to New England**

In an attempt to identify Maine county sub-regions that performed well compared to the New England regional economy, the same county sub-regions (Cumberland, Lincoln, and York) increased their share of the New England economy (Table 9 and Figure 5). The remaining Maine county regions appear to be in a marginal or disadvantaged position, relative to New England as a whole. In general, each Maine county sub-region tended to perform slightly lower when compared to New England, but the relative structure and inter-regional comparisons remains unaltered.

**Table 8. Regional Shift: Maine Counties to Maine**

Year	And.	Aro.	Cum.	Fra.	Han.	Ken.	Kno.	Lin.	Oxf.	Pen.	Pis.	Sag.	Som.	Wal.	Was.	Yor.
1981–1982	0.4	-53.5	31.7	2.7	6.1	6.6	0.4	9.5	-12.4	-20.9	-6.7	11.4	1.6	1.3	-5.7	17.2
1982–1983	-4.7	-18.1	22.4	2.0	1.7	-12.3	-1.6	0.1	-5.6	1.1	0.4	1.5	-16.0	-2.1	3.7	28.8
1983–1984	-15.3	7.2	50.4	-11.6	1.9	-14.1	-1.7	-1.1	-5.5	-3.5	-4.3	-3.3	-0.2	5.5	-15.7	10.6
1984–1985	-25.7	-21.2	74.5	-13.3	14.0	-18.0	12.4	8.1	-20.8	-26.4	-8.9	-0.2	-4.6	-7.0	6.0	30.5
1985–1986	-4.3	-42.0	63.3	-8.3	-2.9	-7.9	-1.0	6.0	-8.7	-34.3	-4.9	16.7	2.9	-0.9	-5.4	32.3

Note: RS>0 implies the region grew faster than Maine and RS<0 implies the region grew slower than Maine.

**Table 9. Regional Shift: Maine Counties to New England**

Year	And.	Aro.	Cum.	Fra.	Han.	Ken.	Kno.	Lin.	Oxf.	Pen.	Pis.	Sag.	Som.	Wal.	Was.	Yor.
1981–1982	-8.4	-60.7	9.3	0.4	2.3	-3.4	-2.5	6.9	-16.6	-32.7	-8.1	8.7	-1.9	-0.7	-8.2	4.2
1982–1983	-6.2	-19.3	18.4	1.6	1.1	-14.1	-2.1	-0.4	-6.3	-0.9	0.2	1.0	-16.6	-2.5	3.3	26.5
1983–1984	-27.5	-1.8	18.8	-14.8	-3.5	-27.9	-5.7	-4.8	-11.1	-19.5	-6.2	-7.2	-4.9	2.7	-19.1	-8.0
1984–1985	-37.5	-30.2	42.9	-16.3	8.7	-31.5	8.4	4.6	-26.3	-42.1	-10.8	-4.0	-9.2	-9.8	2.8	12.1
1985–1986	0.5	38.4	76.7	-7.1	-0.6	-2.4	0.7	7.5	-6.6	-27.9	-4.2	18.2	4.7	0.2	-4.1	40.0

Note: RS>0 implies the region grew faster than New England and RS<0 implies the region grew slower than New England.

**Figure 4**  
**Proportional and Differential Shifts:**  
**Maine Counties Relative to Maine**

		Androscoggin Proportional Shift				Aroostook Proportional Shift	
D i f f S e h r i e n t i a l			+	-			
	+			82-83	+	83-84	
	-	83-84 85-86		81-82 84-85	-		81-82 82-83 84-85 85-86
		Cumberland Proportional Shift				Franklin Proportional Shift	
D i f f S e h r i e n t i a l			+	-			
	+	82-83 83-84 84-85 85-86		81-82	+		81-82 82-83
	-				-		83-84 84-85 85-86
		Hancock Proportional Shift				Kennebec Proportional Shift	
D i f f S e h r i e n t i a l			+	-			
	+	82-83 84-85		81-82	+		
	-	83-84 85-86			-	82-83 83-84 84-85 85-86	81-82

**Figure 4 (cont.)**  
**Proportional and Differential Shifts:**  
**Maine Counties Relative to Maine**

		Knox Proportional Shift	
		+	-
D i f f e r e n t i a l	+	83-84 84-85	
	-	82-83 85-86	81-82

		Lincoln Proportional Shift	
		+	-
D i f f e r e n t i a l	+	82-83 83-84 84-85	81-82
	-	85-86	

		Oxford Proportional Shift	
		+	-
D i f f e r e n t i a l	+		82-83
	-	83-84	81-82 84-85 85-86

		Penobscot Proportional Shift	
		+	-
D i f f e r e n t i a l	+	82-83 83-84	
	-	85-86	81-82 84-85

		Piscataquis Proportional Shift	
		+	-
D i f f e r e n t i a l	+		84-85
	-	81-82 85-86	82-83 83-84

		Sagadahoc Proportional Shift	
		+	-
D i f f e r e n t i a l	+		81-82 82-83 85-86
	-		83-84 84-85

**Figure 4 (cont.)**  
**Proportional and Differential Shifts:**  
**Maine Counties Relative to Maine**

Somerset  
Proportional Shift

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	+	-
+	83-84 85-86	81-82 84-85
-		82-83

Waldo  
Proportional Shift

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	+	-
+	83-84 85-86	82-83
-		81-82 84-85

Washington  
Proportional Shift

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	+	-
+	82-83 84-85	
-	83-84 85-86	81-82

York  
Proportional Shift

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	+	-
+	82-83 83-84 84-85	
-		81-82 85-86

To provide insight into the growth of individual Maine industries, the percentage change in personal income by industry over the period 1981-1986 is computed and reported in Table 10. Recalling the information reported in Table 7, six Maine industries were identified as high growth: construction; wholesale trade; retail trade; finance, insurance, and real estate; services; and in particular, agricultural services, forestry, and fishery. As evident from an examination of Table 9, three of the county sub-regions, which experienced positive regional shifts, more than doubled personal income in three of the six high-growth industries. Those county sub-regions identified as experiencing consistently negative shifts (Androscoggin, Aroostook, Franklin, Oxford, and Piscataquis),



Table 10. Percentage Change in Personal Income by Source 1981-1986

Source	And.	Aro.	Cum.	Fra.	Han.	Ken.	Kno.	Lin.
Farming	-17.0	-101.0	3.0	100.0	19.0	-17.0	189.0	33.0
Ag. Ser, Forest and Fishery	47.0	-12.0	140.0	93.0	206.0	32.0	267.0	217.0
Mining	42.0	-22.0	30.0	25.0	35.0	17.0	33.0	11.0
Construction	73.0	84.0	119.0	-9.0	89.0	67.0	106.0	82.0
Manufacturing	14.0	29.0	38.0	-3.0	39.0	15.0	14.0	47.0
Transportation and Public Utilities	41.0	21.0	39.0	97.0	42.0	26.0	21.0	102.0
Wholesale Trade	35.0	24.0	69.0	56.0	49.0	76.0	20.0	25.0
Retail Trade	44.0	34.0	88.0	61.0	65.0	47.0	59.0	59.0
Finance, Insurance and Real Estate	67.0	32.0	113.0	75.0	67.0	43.0	17.0	69.0
Services	63.0	55.0	78.0	82.0	64.0	55.0	66.0	86.0
Government	53.0	37.0	44.0	49.0	41.0	45.0	44.0	60.0
Total Income	40.0	25.0	59.0	33.0	53.0	42.0	50.0	57.0

experienced declines in several industries, in particular farming, mining, and to some extent, manufacturing.

## Two Maines

While the analysis provides details of individual Maine counties, it does not directly address the notion of "two Maines." It appears reasonable to argue that the combined influences of environmental amenities, tourism, and the spatial proximity to large metropolitan areas (e.g. Boston) provides the coastal sub-regions a comparative advantage in promoting and sustaining economic growth.

To further examine this hypothesis, county sub-regions are combined into two larger sub-regions: coastal counties (Cumberland, Hancock, Knox, Lincoln, Sagadahoc, Waldo, Washington, and York) and inland counties (Androscoggin, Aroostook, Franklin, Kennebec, Oxford, Penobscot, Piscataquis and Somerset). Using the information presented in Table 8, a general description of the recent growth of these two larger sub-regions may be examined. The coastal group experienced a positive regional shift a total of 27 times (each county by each time period) and a negative regional shift 18 times. This suggests that for any given time period, the likelihood of a coastal county experiencing an increase in its share of the Maine economy is 0.6, or 60%. Conversely, the inland group witnessed a positive regional shift 9 times and a negative regional shift 31 times.

**Table 10 (cont). Percentage Change in Personal Income by Source 1981-1986**

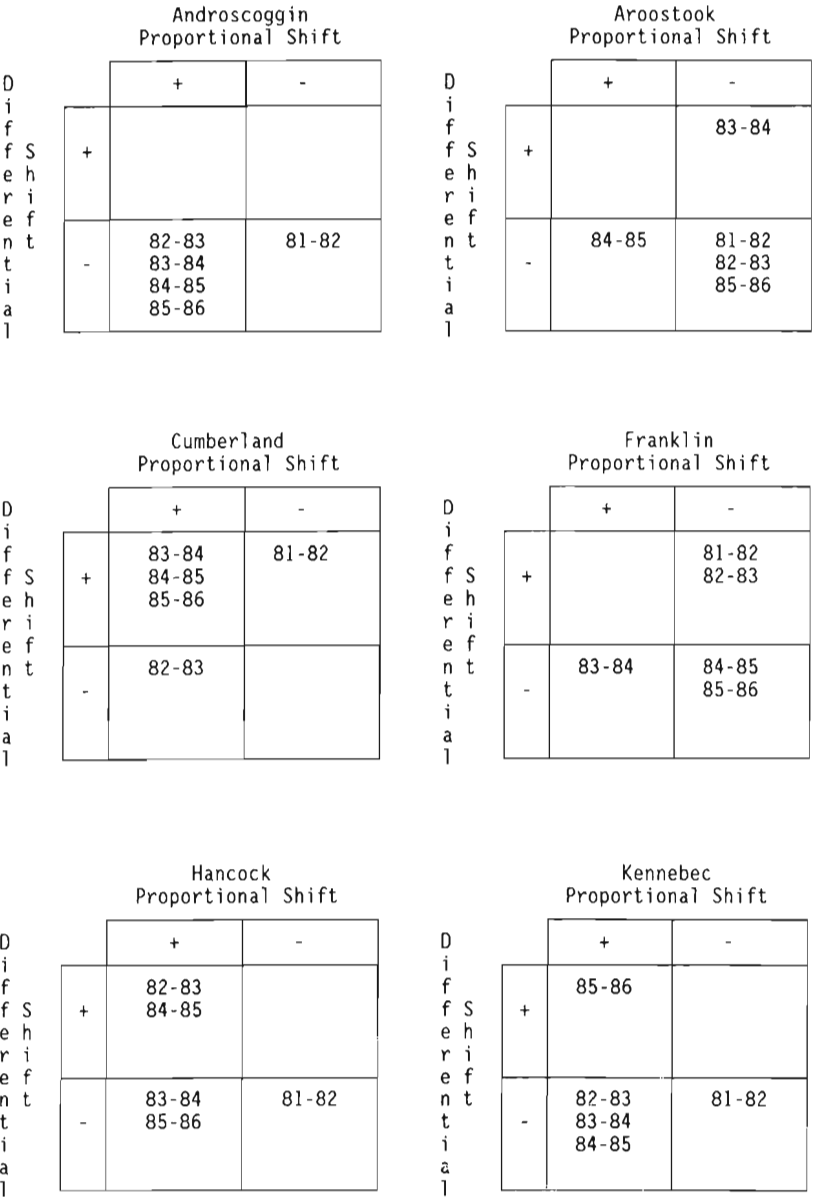
Source	Oxf.	Pen.	Pis.	Sag.	Som.	Wal.	Was.	Yor.
Farming	-19.0	-51.0	-23.0	40.0	44.0	70.0	29.0	17.0
Ag. Ser, Forest and Fishery	76.0	15.0	85.0	192.0	100.0	57.0	279.0	121.0
Mining	-125.0	-35.0	-33.0	17.0	-33.0	33.0	-50.0	7.0
Construction	0.0	95.0	34.0	181.0	64.0	135.0	72.0	158.0
Manufacturing	3.0	20.0	-3.0	42.0	49.0	8.0	-3.0	30.0
Transportation and Public Utilities	47.0	36.0	103.0	10.0	57.0	29.0	57.0	14.0
Wholesale Trade	33.0	45.0	50.0	61.0	39.0	-3.0	85.0	65.0
Retail Trade	46.0	52.0	41.0	83.0	41.0	46.0	34.0	76.0
Finance, Insurance and Real Estate	32.0	60.0	33.0	100.0	74.0	38.0	40.0	125.0
Services	81.0	56.0	29.0	54.0	43.0	62.0	54.0	73.0
Government	45.0	42.0	89.0	11.0	51.0	45.0	46.0	33.0
Total Income	32.0	39.0	27.0	58.0	41.0	45.0	39.0	57.0

In a similar manner, the likelihood of an inland county experiencing an increase in its share of the Maine economy is only 0.22, or about a 22% chance.

Based on these analyses, it appears that the recent growth of the two larger sub-regions has favored the coastal group. In addition, the pattern of proportional and differential shifts indicates that the prospect for continued economic growth in the short-run may be higher in the coastal region. The "two Maines" hypothesis is further highlighted by examining the spatial location of counties exhibiting positive regional, proportional, and differential shifts (Figures 6, 7, and 8). It is important to recall, however, that these analyses do not imply that the disadvantaged inland counties will not experience future economic growth, but rather the coastal counties may possess a comparative advantage.

Four Maine county sub-regions, including Hancock, Lincoln, York, and in particular, Cumberland, appear to have a comparative advantage for sustained economic growth in the short-run. Six county sub-regions, including Androscoggin, Aroostook, Franklin, Kennebec, Oxford, and Piscataquis, appear to be at a comparative disadvantage for sustained economic growth in the short-run. The results of the shift-share analysis reported in this paper lends descriptive support to the hypothesis of "two Maines." Perhaps the only unexpected result is the relatively poor performance of the inland I-95 corridor consisting of the Androscoggin, Kennebec, and Penobscot county sub-regions.

**Figure 5**  
**Proportional and Differential Shifts:**  
**Maine Counties Relative to New England**



**Figure 5 (cont.)**  
**Proportional and Differential Shifts:**  
**Maine Counties Relative to New England**

		Knox Proportional Shift	
		+	-
D i f f S e h r i e n t i a l	+	84-85 85-86	
	-	82-83 83-84	81-82

		Lincoln Proportional Shift	
		+	-
D i f f S e h r i e n t i a l	+	82-83 83-84 84-85	81-82
	-	85-86	

		Oxford Proportional Shift	
		+	-
D i f f S e h r i e n t i a l	+		82-83
	-	83-84 84-85	81-82 85-86

		Penobscot Proportional Shift	
		+	-
D i f f S e h r i e n t i a l	+	82-83	
	-	83-84 84-85	81-82 85-86

		Piscataquis Proportional Shift	
		+	-
D i f f S e h r i e n t i a l	+		82-83 85-86
	-	83-84 84-85	81-82

		Sagadahoc Proportional Shift	
		+	-
D i f f S e h r i e n t i a l	+		81-82 82-83 85-86
	-	83-84	84-85

**Figure 5 (cont.)**  
**Proportional and Differential Shifts:**  
**Maine Counties Relative to New England**

Somerset  
Proportional Shift

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	+	-
+	84-85	81-82 85-86
-	82-83 83-84	

Waldo  
Proportional Shift

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+	83-84 85-86	
-	82-83 84-85	81-82

Washington  
Proportional Shift

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+	82-83 84-85	
-	85-86	81-82 83-84

York  
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	+	-
+	82-83 83-84 85-86	
-	84-85	81-82

## SUMMARY

This research has attempted to address the issue of regional economic growth in the New England region, with particular emphasis on the state of Maine, by employing shift-share analysis. Using income data from 1981 to 1986, the shift-share method is able to identify shifts in the sub-regional share of regional (or national) growth and the basic economic structure of the sub-region's growth relative to the reference economy.

The analysis revealed that New England as a whole, and each New England state in particular, increased its share of the national economy. By decomposing the regional shift into proportional and differential shifts, the analysis sug-

gests that New England as a whole, as well as its individual states, appear to be in a positive position for continued economic growth in the short-run.

From a national perspective, the economic growth of Maine appears to be based on the high growth of a few specialized industries. From a New England perspective, the economic growth of Maine appears to be based on a well-balanced economic base that is growing at a slow, but steady, rate. In short, the Maine economy appears to have out-performed the national economy, but did not perform as well as the New England economy.

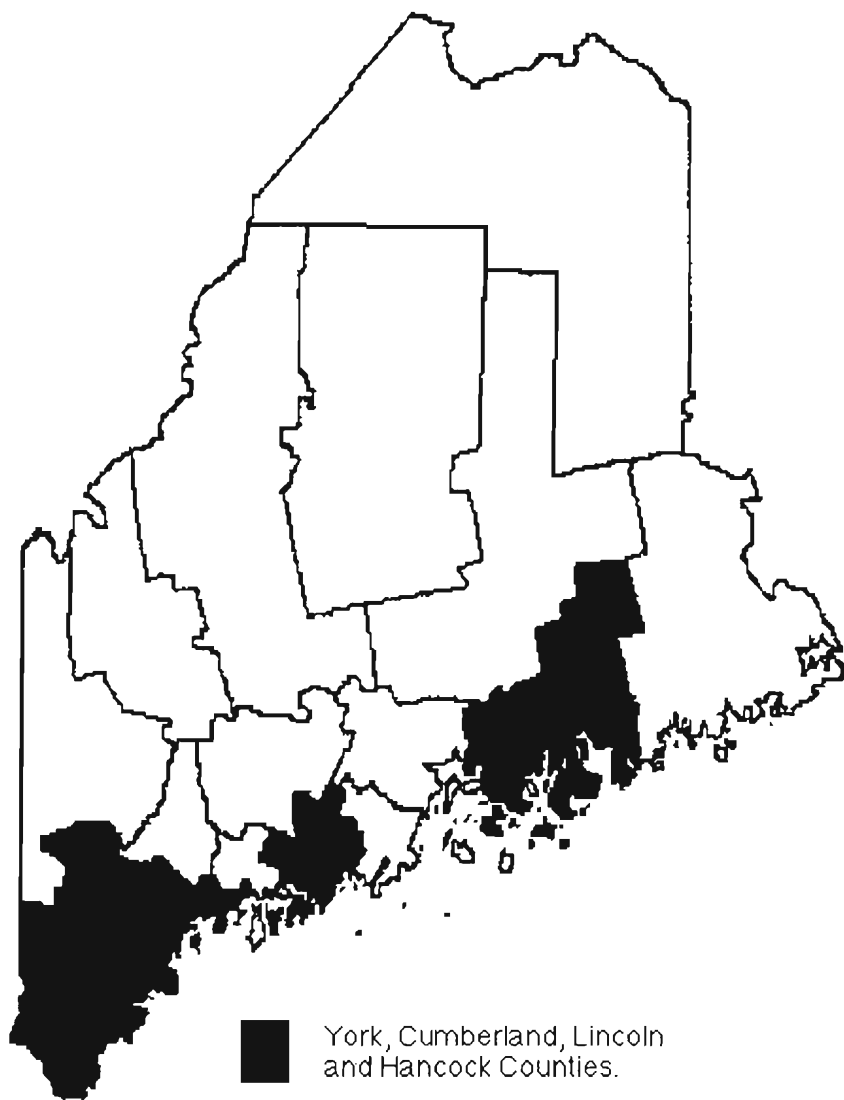
Analysis of Maine sub-regions supports the notion of "two Maines" in that a group of southern coastal counties increased their share of both the Maine and New England economy. Examination of the proportional and differential shifts suggest that these same southern counties may have a comparative advantage over the remainder of Maine counties in supporting future economic growth.

The results of the shift-share analysis reported in this paper are primarily descriptive in nature. Although it may be reasonable to expect that any trends that have been identified may continue in the short-run, the method does not identify causes and effects. The shift-share method provides descriptive evidence and hence should not be used as the sole foundation for development policy. Rather, policy should be based on methods designed to capture cause and effect relationships. The results of the shift-share analysis, however, do identify significant economic diversity across the state of Maine. Future economic development policy should reflect this diversity.

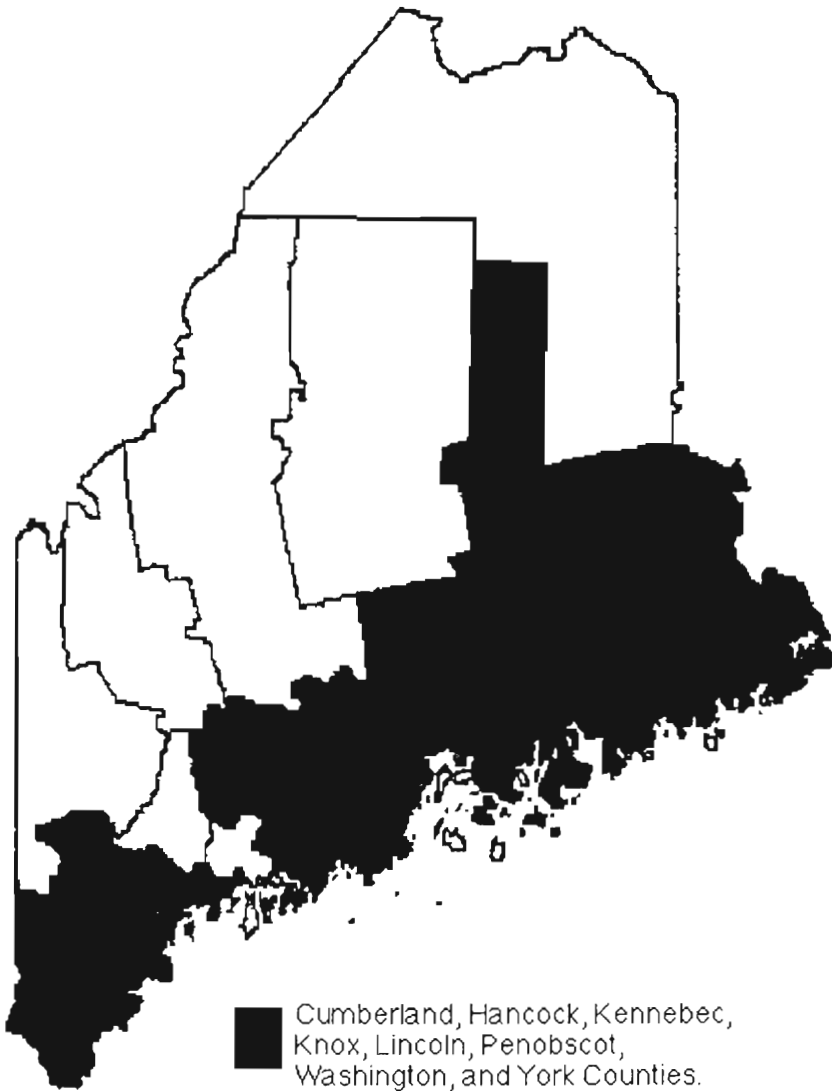
## REFERENCES

- Ashby, L.D. 1964. The geographical redistribution of employment: An examination of the elements of change. *Survey of Current Business* 44:13-20.
- Hewings, G.J.D. 1977. *Regional Industrial Analysis and Development*. London: Methuen & Co.
- Paraskevopoulos, C.C. 1974. Patterns of regional economic growth. *Regional and Urban Economics* 4:77-105.
- Perloff, H.S., E.S. Dunn Jr., E.E. Lampard, and R.F. Muth. 1960. *Regions, Resources and Economic Growth*. Lincoln, Nebraska: University of Nebraska Press.
- Stevens, B.H. and C.L. Moore. 1980. A critical review of the literature on shift-share as a forecasting technique. *Journal of Regional Science* 20:419-436.

**Figure 6**  
**Maine Counties with Positive Regional Shifts**  
**(Relative to Maine)**



**Figure 7**  
**Maine Counties with Positive Proportional Shifts**  
**(Relative to Maine)**





**Figure 8**  
**Maine Counties with Positive Differential Shifts**  
**(Relative to Maine)**

